



ENERGY STAR® Program Requirements Product Specification for Residential Windows, Doors, and Skylights

Eligibility Criteria Draft 2 Version 6.0

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9 Following is the **Draft 2** Version 6.0 product specification for ENERGY STAR qualified windows, doors, and
10 skylights. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.
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12 **Note:** This Draft 2 Version 6.0 specification contains EPA's proposed revisions for residential windows, doors,
13 and skylights. Please send comments via email to windows@energystar.gov no later than Friday, February 8,
14 2013.

15
16 1) **Definitions:** Below are the definitions of the relevant terms in this document. Most definitions are based on
17 or pulled directly from the National Fenestration Rating Council (NFRC) 600-2010 except where otherwise
18 noted.
19

20 Product Types

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22 A. **Window:** An assembled unit consisting of a frame/sash component holding one or more pieces of
23 glazing functioning to admit light and/or air into an enclosure and designed for a vertical installation in an
24 external wall of a residential building. Includes sidelites and transoms greater than 700 mm (27 in)
25 in width, operable transoms, and operable glazed sidelites (per NFRC 100-2010).
26
27 B. **Door:** A sliding or swinging entry system (including sidelites and transoms) designed for and installed in
28 a vertical wall separating conditioned and unconditioned space in a residential building. ENERGY STAR
29 recognizes three categories of doors:
30
31 i) **Opaque:** A door with no glazing or a slab sidelite greater than 700 mm (27 in) in width (per NFRC
32 100-2010).
33
34 ii) **≤ ½-lite:** A door with ≤ 900 in² (0.581 m²) of glazing (per NFRC 100-2010). Includes ¼- and ½-lite
35 doors.
36
37 iii) **> ½-lite:** A door with > 900 in² (0.581 m²) of glazing (per NFRC 100-2010). Includes ¾-lite and fully
38 glazed doors.
39

40 **Note:** EPA has revised the door definitions for ≤ ½-lite and > ½-lite to reflect the glazing level definitions used in
41 NFRC 100-2010.

- 42
43 C. **Skylight:** A window designed for sloped or horizontal application in the roof of a residential building, the
44 primary purpose of which is to provide daylighting and/or ventilation.
45

46 Product Subcategories

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48 D. **Sliding Door:** A door that contains one or more manually operated panels that slide horizontally within a
49 common frame.
50
51 E. **Swinging Door:** A door system having, at a minimum, a hinge attachment of any type between a leaf and
52 jamb, mullion, or edge of another leaf or having a single, fixed vertical axis about which the leaf rotates
53 between open and closed positions.
54
55 F. **Sidelite:** A fenestration product 700 mm (27 in) in width or less consisting of a glazed frame or a non-
56 operable sash within a frame that is used as a companion product installed on one or both sides of a
57 door (per NFRC 100-2010).
58
59

- 60 G. Transom: A fenestration product 700 mm (27 in) in width or less consisting of a glazed frame or a non-
61 operable sash within a frame that is used as a companion product installed above a door (per NFRC
62 100-2010).
63
64 H. Tubular Daylighting Device (TDD) or tubular skylight: A non-operable device primarily designed to
65 transmit daylight from a roof surface of a residential building to an interior ceiling surface via a tubular
66 conduit. The device consists of an exterior glazed weathering surface, a light transmitting tube with a
67 reflective inside surface and an interior sealing device, such as a translucent ceiling panel. TDDs are
68 considered skylights.
69

70 **Note:** At this time, the classification of TDDs as a subtype of skylights has not changed. Additional information is
71 required before EPA can make any decisions regarding how TDDs will be handled under the Version 6.0
72 specification. EPA will continue to monitor developments. If it becomes necessary, EPA may reconsider TDDs'
73 classification under skylights, but this is one of several options that EPA may consider.

- 74
75 I. Dynamic Glazing Product: Any fenestration product that has the fully reversible ability to change its
76 performance properties, including U-factor, SHGC, or Visual Transmittance. This includes, but is not
77 limited to, shading systems between the glazing layers and chromogenic glazing.
78
79 i) Chromogenic glazing: A broad class of changeable glazings that have means to reversibly vary their
80 optical properties, including active materials (e.g., electrochromic and Suspended Particle
81 Device/SPD) and passive materials (e.g., photochromic, thermochromic, etc.).
82
83 ii) Internal Shading System: Operable blinds or shades positioned between glass panes in a window,
84 door, or skylight.
85

86 Performance Metrics

- 87
88 J. U-Factor: The heat transfer per time per area and per degree of temperature difference (Btu/h ft²·°F).
89 The U-factor multiplied by the interior-exterior temperature difference and by the projected fenestration
90 product area yields the total heat transfer through the fenestration product due to conduction,
91 convection, and long-wave infra-red radiation.
92
93 K. Solar Heat Gain Coefficient (SHGC): The ratio of the solar heat gain entering the space through the
94 fenestration product to the incident solar radiation.
95
96 L. Air Leakage: The volume of air flowing per unit time per unit area (cfm/ft²) through a fenestration system
97 due to air pressure or temperature difference between the outdoor and indoor environment.
98

99 Other

- 100
101 M. Residential Building: A structure used primarily for living and sleeping that is zoned as residential and/or
102 subject to residential building codes. For the purposes of ENERGY STAR, “residential building” refers to
103 buildings that are three stories or less in height.
104
105 N. Insulating Glass Unit (IGU): A preassembled unit, comprising lites of glass, which are sealed at the
106 edges and separated by dehydrated space(s).
107

108 2) Scope:

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110 A. Included Products: Products that meet the definition of a residential window, door, or skylight as
111 specified herein are eligible for ENERGY STAR qualification, with the exception of products listed in
112 Section 2.B.
113
114 B. Excluded Products: Products that are assembled onsite, including but not limited to sash packs or sash
115 kits; windows, doors, or skylights that are intended for installation in non-residential buildings; window,
116 door, or skylight attachments that are not included in a product’s NFRC-certified rating.
117
118

119 3) **Qualification Criteria:**

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121 A. **Energy Efficiency Requirements:** To qualify for ENERGY STAR, products shall have NFRC-certified U-
122 factor and, where applicable, SHGC ratings at levels which meet or exceed the minimum qualification
123 criteria specified in Tables 1-3. Windows and skylights shall meet the criteria for a given ENERGY STAR
124 Climate Zone. Doors shall meet the criteria for a given glazing level. Dynamic glazing products shall
125 meet the criteria while in the minimum tinted state for chromogenic glazing products or the “fully open”
126 position for internal shading systems.
127

Table 1. Energy Efficiency Requirements for Windows		
Climate Zone	U-Factor¹	SHGC²
Northern	≤ 0.27	Any
North-Central	≤ 0.29	≤ 0.40
South-Central	≤ 0.31	≤ 0.25
Southern	≤ 0.40	≤ 0.25

Table 2. Energy Efficiency Requirements for Doors			
Glazing Level	U-Factor¹	SHGC²	
Opaque	≤ 0.17	No Rating	
≤ ½-Lite	≤ 0.25	≤ 0.25	
> ½-Lite	≤ 0.30	Northern	≤ 0.40
		North-Central	
		South-Central Southern	≤ 0.25

128

129

130 **Note:** EPA understands from stakeholder comment that a U-factor maximum of 0.25 (rather than 0.23) would
131 allow a full-lite and a ½-lite door to use the same door slab and glass package. As such, the U-factor criterion
132 has been revised for consistency.
133

134 Stakeholders also expressed concerns about full-lite doors in the Northern Zone requiring a different glass
135 package from windows in the Northern Zone. The different glass packages have different appearances in terms
136 of color, which stakeholders feel would cause customer dissatisfaction. Based on this feedback, EPA is
137 proposing zonal SHGC requirements for full-lite doors as shown in Table 2 above. This approach will allow full-
138 lite doors in the Northern and North-Central Zones to use the same glass package as qualifying windows in
139 those zones. The SHGC proposed for the Southern and South-Central Zones will allow the Version 6.0 criteria to
140 match the IECC 2012 SHGC requirements for glazed fenestration in those zones.
141

Table 3. Energy Efficiency Requirements for Skylights		
Climate Zone	U-Factor¹	SHGC²
Northern	≤ 0.45	≤ 0.35
North-Central	≤ 0.47	≤ 0.30
South-Central	≤ 0.50	≤ 0.25
Southern	≤ 0.60	≤ 0.25

142

143 **Note:** The skylight specification has not been changed from Draft 1. As mentioned earlier, EPA will not be
144 making any revisions to the specification to account for the changes in TDD test results until additional
145 information is available.

146

147 ¹ Btu/h ft²·°F

148 ² Solar Heat Gain Coefficient

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150 B. **Equivalent Energy Performance:** To qualify for ENERGY STAR, windows may also have NFRC-certified
151 U-factor and, where applicable, SHGC ratings at levels which meet or exceed the equivalent energy
152 performance criteria specified in Table 4. These criteria allow windows with energy performance
153 equivalent to the prescriptive criteria to qualify in the Northern Zone. Equivalent performance criteria are
154 not applicable to the North-Central, South-Central, or Southern Zones or to doors or skylights.
155

Climate Zone	U-Factor¹	SHGC²
Northern	= 0.28	≥ 0.32
	= 0.29	≥ 0.37
	= 0.30	≥ 0.42

Note: EPA has expanded the Equivalent Energy Performance for Windows as shown in Table 4 above. There are now two additional equivalent energy performance criteria available for high-gain products.

¹ Btu/h ft²·°F

² Solar Heat Gain Coefficient

- C. **Air Leakage Requirements:** To qualify for ENERGY STAR, products shall have air leakage ratings at levels which meet or exceed the minimum qualification criteria specified in Table 5. Windows, sliding doors, and skylights shall demonstrate adherence to this requirement by displaying “≤ 0.3” in the air leakage portion of the NFRC temporary label. Swinging doors shall demonstrate adherence to this requirement by displaying “≤ 0.5” in the air leakage portion of the NFRC temporary label. Manufacturers may test and/or add the necessary labeling as their products come up for NFRC re-certification.

Product	Air Leakage Rating
Window, sliding door, or skylight	≤ 0.3 cfm/ft ²
Swinging door	≤ 0.5 cfm/ft ²

- D. **Installation Instructions:** To qualify for ENERGY STAR, products shall have installation instructions readily available online or packaged with the product. Electronic versions of instructions may be provided on the website of a retailer, manufacturer, and/or industry association. Retailers, manufacturers, and industry associations may include in these instructions whatever disclaimers they feel are necessary to limit their liability. EPA understands that the manufacturer cannot write installation instructions for every situation and that generic instructions covering the most common situations are acceptable to fulfill this requirement. The installation instructions shall include:

Note: EPA has added language to clarify the intent of the installation instructions requirement. Many stakeholders inferred from the original Draft 1 wording that the installation instructions requirement was prescriptive in nature, i.e. that EPA would review each item listed below for completeness. This is not the case. Further, stakeholders expressed concern about the liability they would assume by including the items listed below. EPA hopes the revised introductory language clarifies the intent of this requirement and lessens stakeholders’ concerns about liability.

- i) A list of hardware and tools required for installation, including those provided by the manufacturer and those not provided by the manufacturer.
- ii) Diagrams/pictures and descriptions of the product or a typical product of similar type and parts provided by the manufacturer.

Note: EPA added this language so that manufacturers can have more flexibility in choosing the particular installation instructions provided with products.

- iii) General guidance on safely removing old products and preparing the frame for installation, including . Guidance should direct consumers to relevant content on proper management of lead paint, such as www.epa.gov/lead. Where possible, guidance should also offer information on recycling or proper disposal of products being removed, when applicable. (Inclusion of diagrams/pictures is preferred, but optional.)

Note: EPA only seeks a mention of lead paint management in the installation instructions, so the language has been revised accordingly. EPA would also like a mention of disposal and/or recycling resources where possible.

- 205 iv) Detailed flashing instructions including diagrams/pictures or reference to the applicable flashing
206 manufacturer's instructions, as applicable to the product.
207

208 **Note:** In some installation scenarios, proper flashing may not be possible. For products likely to be installed in
209 such scenarios, manufacturers may omit flashing details.

- 210
211 v) Instructions on properly shimming the product to achieve an installation that is flush, level, and
212 plumb. (Inclusion of diagrams/pictures is preferred, but optional.)
213
214 vi) Guidance on sealing and weatherproofing to prevent air and water infiltration at the product-wall
215 interface. (Inclusion of diagrams/pictures is preferred, but optional.)
216

217 **Note:** To clarify that the sealing and weatherproofing guidance should be directed at preventing air and water
218 infiltration from the installation itself rather than preventing water and air infiltration through the product, EPA has
219 added language to that effect.

- 220
221 vii) Variations of the above based on whether the job is a pocket installation, rough opening installation
222 with exterior sheathing intact, and/or rough opening installation with exterior sheathing removed (e.g.
223 new construction installation), as applicable to the product.
224

225 Disclaimer: EPA makes no warranties, expressed or implied, nor assumes any legal liability or
226 responsibility for the accuracy, completeness, or usefulness of the contents of installation instructions, or
227 any portion thereof. Further, EPA cannot be held liable for defects or deficiencies resulting from the
228 proper or improper application of installation instructions.
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230 **4) Test Requirements:**

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232 A. Representative Models shall be selected for testing per the following requirements:

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234 i. For qualification of an individual product model, the representative model shall be equivalent to that
235 which is intended to be marketed and labeled as ENERGY STAR.
236
237 ii. Qualification of a product family is not permitted under this specification.
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239 B. When testing residential windows, doors, and skylights, the test methods shown in Table 6 shall be used
240 to determine ENERGY STAR qualification:
241

243 ENERGY STAR Requirement	244 Test Method Reference
245 U-Factor	NFRC 100
246 SHGC	NFRC 200
247 Air Leakage	248 ASTM E283 in accordance with NFRC 400 or 249 AAMA/WDMA/CSA 101/I.S.2/A440-11

250 **Note:** EPA clarified the test method language with respect to air leakage to ensure that the requirement is clear.
251

252 C. All products containing IGUs shall have them certified according to NFRC procedures.
253

254 5) **Effective Date:** The ENERGY STAR Residential Windows, Doors, and Skylights specification shall take
255 effect on January 1, 2014. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR
256 specification in effect on the model's date of manufacture. The date of manufacture is specific to each unit
257 and is the date on which a unit is considered to be completely assembled.

6) **Future Criteria Revisions:** ENERGY STAR reserves the right to change the specification should
technological and/or market changes affect its usefulness to consumers, industry, or the environment. In
keeping with current policy, revisions to the specification are arrived at through industry discussions. In the
event of a specification revision, please note that the ENERGY STAR qualification is not automatically
granted for the life of a product model.

ENERGY STAR Qualification Criteria for Residential Windows, Doors, and Skylights

Climate Zone	Windows		
	U-Factor ¹	SHGC ²	
Northern	≤ 0.27	Any	Prescriptive
	= 0.28	≥ 0.32	Equivalent Energy Performance
	= 0.29	≥ 0.37	
	= 0.30	≥ 0.42	
North-Central	≤ 0.29	≤ 0.40	
South-Central	≤ 0.31	≤ 0.25	
Southern	≤ 0.40	≤ 0.25	

262 Air Leakage ≤ 0.3 cfm/ft²

263

264 ¹ Btu/h ft²·°F

265 ² Solar Heat Gain Coefficient

266

Glazing Level	Doors		
	U-Factor ¹	SHGC ²	
Opaque	≤ 0.17	No Rating	
≤ ½-Lite	≤ 0.25	≤ 0.25	
> ½-Lite	≤ 0.30	Northern North-Central	≤ 0.40
		Southern South-Central	≤ 0.25

268 Air Leakage for sliding doors ≤ 0.3 cfm/ft²

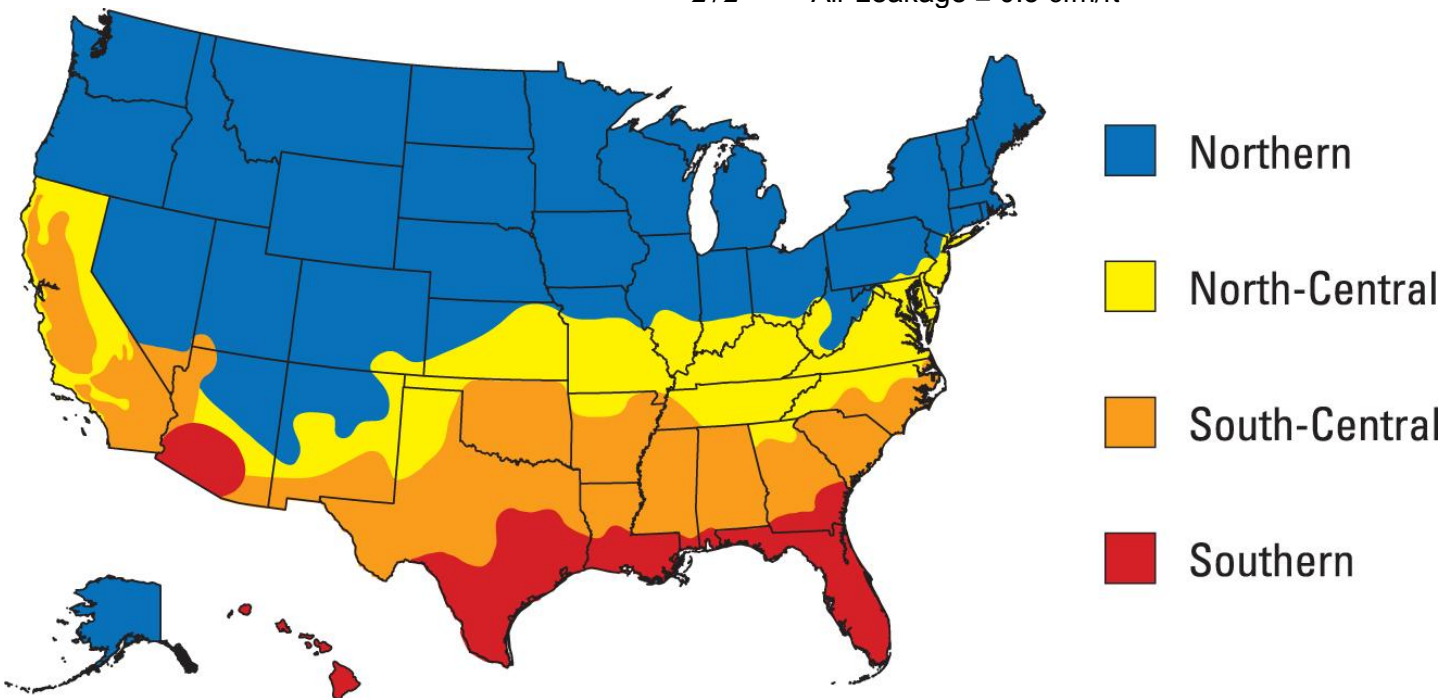
269 Air Leakage for swinging doors ≤ 0.5 cfm/ft²

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271 Skylights

Climate Zone	U-Factor ¹	SHGC ²
Northern	≤ 0.45	≤ 0.35
North-Central	≤ 0.47	≤ 0.30
South-Central	≤ 0.50	≤ 0.25
Southern	≤ 0.60	≤ 0.25

272 Air Leakage ≤ 0.3 cfm/ft²



Note: A complete list of ENERGY STAR Climate Zones by state and county or, where applicable, zip code is available at https://www.energystar.gov/index.cfm?fuseaction=windows_doors.search_climate.